Evaluation of Emerging Flash Flood Decision-Making Products and Tools in the HMT Multi-Radar Multi-Sensor Hydro Experiment

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Numerous challenges exist with the prediction and warning of flash flood events, one of the deadliest weather phenomena in the United States. The Hydrometeorological Tested (HMT) Multi-Radar Multi-Sensor (MRMS) Hydro Experiment (hereinafter denoted as the HMT-Hydro Experiment) was created to allow operational NWS forecasters to assess emerging products and techniques designed to improve the detection and warning of flash flooding. The HMT-Hydro Experiment ran in conjunction with the Flash Flood and Intense Rainfall (FFaIR) Experiment at the Weather Prediction Center (WPC). This collaboration allowed for the simulation of real-time workflow between the issuance of probabilistic forecasts and guidance at the WPC and the issuance of flash flood products at a National Weather Service (NWS) forecast office.

The experimental products evaluated were from the Flooded Locations and Simulated Hydrographs (FLASH) product suite, which ingests the radar-only QPE from the MRMS system. Products within the FLASH suite include QPE average recurrence intervals (ARIs), QPE-to-FFG ratios, soil saturation and forecasts of flooding from a distributed hydrologic model. FLASH products are generated on the same grid as MRMS (0.01° × 0.01°) across the CONUS that update every 2–10 min. These products were utilized in a real-time testbed environment for the issuance of short-term flash flood watches (FFAs) and flash flood warnings (FFWs). The FLASH product suite is scheduled for operational implementation in May 2016.

Visiting forecasters communicated probabilistic forecasts for nuisance and major flash flooding in the FFAs and FFWs. Reliability assessments of the probabilistic forecasts of nuisance and major flash flooding showed distinct patterns of under- and over-forecasting of flash floods, which occasionally differed from the subjective evaluation of probabilistic forecasts. FFAs and FFWs were generated using the Hazard Services platform in the AWIPS2 environment. Within Hazard Services was a flash flood recommender tool, which is designed to contour a threat area based on user-defined criteria that can be converted into a flash flood warning polygon. Feedback through free-response surveys noted a number of limitations of the use of recommenders in warning operations. Continued work will evaluate a multi-variable flash flood recommender algorithm and the role of recommenders with respect to user reliance and situational awareness.